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ABSTRACT

With the continuing shift toward more decentralized, team-based work structures, efforts to improve quality are often linked to efforts to improve productivity. This ongoing restructuring of the workplace has important implications for technical education. Educators need to have an understanding of how and why organizations are pursuing these changes. A widely prevalent assumption in the literature is that both goals--quality and productivity--can be achieved by the same management strategy. In reality, although the changes initiated by process-oriented quality programs can reduce the amount of scrapped or reworked products and boost measures of productivity, such changes can also involve revisions in work processes that increase costs and lower measures of productivity. Evidence shows that employees can--on the whole--make more accurate decisions about issues of quality (and efficiency) than their managers, but there is no guarantee. The wave of the future is clearly a continuing decentralization of authority and more teamwork. An instructional model for technical education that provides training in the specific skills needed in today's team-based workplaces is cooperative learning. The challenge for technical educators is to gain an understanding of the basic ideas and techniques involved in cooperative learning. They need to consult with others who have used group techniques, develop applications appropriate for their own classrooms, take the plunge, and stay the course. (Contains 14 references.) (YLB)

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THE CHALLENGE OF EDUCATING FOR QUALITY AND PRODUCTIVITY IN THE TECHNICAL WORKPLACE

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J Magney

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Introduction

Thousands of employers have committed themselves to the achievement of higher levels of quality and productivity. This has been especially true in the private sector, but increasingly many government agencies are also giving priority to these goals. Historically, these concerns with productivity and quality grew out of quite different management research traditions and -- for many years -- they were dealt with in separate workplace programs. This has changed. Today, with the continuing shift toward more decentralized, team-based work structures, efforts to improve quality are often linked to efforts to improve productivity. Unlike the older hierarchical work structures, where employee behavior was closely regulated by formal controls, workers in today's teamwork structures are encouraged to give input on -- and help resolve -- workpiace problems.

This ongoing restructuring of the U.S. workplace has important implications for technical education. Educators need to have an understanding of how and why organizations are pursuing these changes. This is essential if they are to give their students an adequate set of skills for coping with today's work routines. In a moment, I will desribe an emerging pedagogy which I think has great relevance for technical educators. But before I get into that, let's take a look at the historical record on quality and productivity, at how they were treated in the traditional bureaucratic workplace, and at how they came to be linked together in today's teamwork structures.

An Historical Record

Notions of productivity have long dominated the thinking of modern management. How to get more units of product for the same (or fewer) units of worker-energy was the key question for Frederick Taylor's (1972) seminal musings on scientific

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management a hundred years ago. Taylor felt that workers were naturally inclined to limit their productivity (through "soldiering"). The way to deal with this, he argued, was for managers to develop systems to measure, monitor -- and control -- workplace behavior. A similar concern guided the development of Fordism and assembly-line technology in the auto industry in the 1920s. Industrial engineering went on to refineTaylor's measurment ideas into the methodology of time and motion studies. And programs to upgrade productivity became a standard feature of the industrial landscape. These programs were carried out through bureaucratic rules and regulations devised by management, usually with limited input from bottomline employees. Industrial unions, however, did begin to exercise some control over production issues after World War II (Gomberg, 1955).

For many years, quality was determined through the final inspection of products; if an item passed inspection, it went on the market, if not, it was scrapped or reworked. A revisionist view on quality emerged in the 1930s in the work of Walter Shewhart (1931) and his colleagues. They developed a sophisticated statistical methodology to measure and control quality levels*within* production processes. But these techniques were poorly understood and not applied to any significant degree until World War II, with the buildup of the defense industry. But this was only a partial breakthrough, and after the war, little effort was made to maintain these statistical quality programs. Not unitl the 1970s, with the continuing Japanese success in U.S. markets, did U.S. manufacturers begin to seriously address the quality of American production.

As quality moved up the corporate agenda, many companies decided to set up Japanese style "quality circles" -- little groups of workers discussing their immediate job conditions and making suggestions for change (Lawler and Mohrman, 1985). Other companies opted for the broader vision encompassed in "quality of working life" programs. Here the focus was on the whole working environment, not just the immediate work site, and how to restructure this environment to promote higher levels of quality (Lawler, Mohrman & Ledford, 1992). Organizing employees into work teams with increased decision-making responsibilities seemed to get very good results. Companies with unions often encountered employee skepticism about the value of these programs. But, interestingly, research showed that these companies were more likely to develop effective employee-involvement programs than those with nonunionized workforces (Hoerr, 1991).

Contemporary Workplace Challenges

A widely prevalent assumption in the literature on modern quality programs is that what is good for quality is also good for productivity; both goals can be achieved by the same management strategy (Deming, 1982 and Juran & Gryna, 1993). In reality, the situation is not quite this simple. While it is true that changes initiated by process-oriented quality programs can reduce the amount of scrap and rework (and thus boost measures of productivity), such changes can also involve revisions in work processes

that increase costs (and thus lower measures of productivity). Today's emphasis on consumer-driven improvements in quality definitely creates challenges for hardnosed productivity programs.

There is no mistaking the value of employee participation in decisions about quality and productivity. From the original Japanese quality circles on through today's workcenter teams, we have an abundance of evidence that employees can -- on the whole -- make more accurate decisions about issues of quality (and efficiency) than their managers (Rothschild & Whitt, 1986). But there is no guarantee that this will happen. Employee teams can be incredibly effective, or a complete bust. What is important is that their members have good leadership and communication skills, trust one another, and be rewarded (psychologically and otherwise) for their contributions to the group (Scholtes, 1988). Organizations need to pay careful attention to the ways they build -- and nuture -- employee teamwork.

Workteam decisions about quality and productivity issues may involve tradeoffs with one another, but they tend not to stir up significant problems in organizations. The productivity gains that are achieved at these lower levels typically involve incremental changes in worksite procedures. Employees support these sorts of efficiencies in part because they thought them up, but also because they view them as improvements in their working environment. The main thrust here is on "working smarter" in existing jobs rather then on eliminating jobs.

The situation is quite different for the topdown campaigns to "re-engineer" the work place. Here the emphasis is on obtaining large gains in productivity through the application of computer technology and other major changes in workplace organization (Hammonds, Kelly & Thurston, 1994) . Largescale reductions in work forces are not uncommon, and employees rightfully fear the consequences of these programs. Those who survive may still have a job, but they will likely be working in an environment beset with morale problems. This definitely creates problems for any teamwork driven quality program, given the high level of motivation, trust and participation required by such programs.

There's a real irony here. On the one hand, these re-egineering campaigns have tried to build more productive organizations by eliminating whole layers of middle-management and shifting responsibility to lower-level units. But, on the other hand, they create a climate of fear and uncertainty which impedes what they are trying to build up. Of course this is a short run view. In the longer run, once the memories of the bloodletting have faded, perhaps we will find teams in these restructured organizations operating just as effectively as those in more stable settings. Whatever the case, as organizations continue to restructure themeselves, we will undoubtedly see a continuing decentralization of authority and more teamwork. That clearly seems to be the wave of the future (Appelbaum & Batt, 1994).

Educating for Cooperation

What, then, does all of this mean for technical education? In the first place, it's crucial that educators understand the scope of change that is occurring in our workplaces. Recently an editor of a technical education journal told me he couldn't understand what I was talking about: "Change?...I see most organizations continuing to function along autocratic lines." I don't know what this person has been doing in recent years, but he surely hasn't been paying much attention to the real world. I can understand differences of opinion about *how* the U.S. workplace is changing, but to deny the existence of change is pretty dense. Hopefully this is not a representative opinion. I know that my colleagues at SIU, and working teachers I've met at these AVA meetings, understand that serious changes are happening in our nation's workplaces.

In the past, technical education prepared students for workplace routines mainly through the classroom "boss" model; students took orders from their teachers much as they would take orders from their bosses at work. While there are still plenty of traditional bosses in our workplaces, we are seeing a continuing growth of teamwork authority structures, which is a quite different situation. To work effectively on teams, one needs to know more than how to take orders. One needs to develop a range of skills in leadership, communications, decision-making and group processes.

An instructional model which provides training in the specific skills needed in today's team-based workplaces is cooperative learning. This model emerged from a tradition of research into small group cooperation originated by Kurt Lewin in the 1930s. The educational merits of cooperation have been documented in hundreds of studies at all levels, from kindergarten all the way through college. These studies have shown that cooperating groups of students typically score higher on tests of academic achievement along with gaining skills in communication, leadership and group process (Johnson & Johnson, 1989).

Teachers in the cooperative classroom retain control over course content, student conduct and grades, but become much more involved in classroom processes. A frequently cited slogan is that they move from being "sages on the stage to guides on the side." Making the change to cooperative learning involves a significant shift in one's teaching techniques. But, as Johnson and Johnson (1994) note, it has a significant payoff: "We are for cooperation, not only because its sharing, helping, communicating, and mutual-concern aspects are consonant with our values but also because research supports its use in a large number of situations. All the research we have reviewed, the research we have conducted, and our own instincts indicate that cooperation is the appropriate goal structure for most institutional situations."

The challenge for technical educators is gain an understanding of the basic ideas and techniques involved in cooperative learning. They need to consult with others who have used group techniques, develop applications appropriate for their own

classrooms, and then take the plunge -- and stay the course. As with all new methods, one does not become an instant expert with cooperative learning. And there may be no immediate signs that you have made the right move. But, over time, if you have applied the methodology correctly, you will likely see accumulating evidence that your students have been positively affected by the experience, both in their learning of technical skills and of workplace skills. That is the promise of cooperative learning.

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